



# ICAO ENGINE EXHAUST EMISSIONS DATA SHEET

## SUBSONIC ENGINES

ENGINE IDENTIFICATION: Trent 1000-A BYPASS RATIO: 9.5  
 UNIQUE ID NUMBER: 12RR055 PRESSURE RATIO ( $\pi_{co}$ ): 41.0  
 COMBUSTOR: Phase5 Tiled  
 ENGINE TYPE: TF RATED THRUST ( $F_{oo}$ ) (kN): 310.9

REGULATORY DATA **\*\* DATA SUPERSEDED \*\*** SEE FOLLOWING UID FOR REVISED DATA: **12RR061**

| CHARACTERISTIC VALUE:                        | HC  | CO   | NO <sub>x</sub> | SMOKE NUMBER |
|--|-----|------|-----------------|--------------|
| D <sub>p</sub> /F <sub>oo</sub> (g/kN) or SN | 0.1 | 11.7 | 58.4            | 6.5          |
| AS % OF ORIGINAL LIMIT                       | 0.3 | 9.9  | 47.8            | 37.5         |
| AS % OF CAEP/2 LIMIT (NO <sub>x</sub> )      |     |      | 59.8            |              |
| AS % OF CAEP/4 LIMIT (NO <sub>x</sub> )      |     |      | 65.5            |              |
| AS % OF CAEP/6 LIMIT (NO <sub>x</sub> )      |     |      | 72.0            |              |
| AS % OF CAEP/8 LIMIT (NO <sub>x</sub> )      |     |      | 80.8            |              |

### DATA STATUS

- PRE-REGULATION  
 x CERTIFICATION  
 x REVISED (SEE REMARKS)

### TEST ENGINE STATUS

- NEWLY MANUFACTURED ENGINES  
 x DEDICATED ENGINES TO PRODUCTION STANDARD  
 - OTHER (SEE REMARKS)

### EMISSIONS STATUS

x DATA CORRECTED TO REFERENCE  
 (ANNEX 16 VOLUME II)

### CURRENT ENGINE STATUS

(IN PRODUCTION, IN SERVICE UNLESS OTHERWISE NOTED)  
 x OUT OF PRODUCTION (DATE: - )  
 - OUT OF SERVICE (DATE: - )

### MEASURED DATA

| MODE   | POWER SETTING (%F <sub>oo</sub> ) | TIME (minutes) | FUEL FLOW (kg/s) | EMISSIONS INDICES (g/kg) |           |                 | SMOKE NUMBER |
|--|-----------------------------------|----------------|------------------|--------------------------|-----------|-----------------|--------------|
|  |                                   |                |                  | HC                       | CO        | NO <sub>x</sub> |              |
| TAKE-OFF   | 100                               | 0.7            | 2.282            | 0.00                     | 0.51      | 46.42           | 3.5          |
| CLIMB OUT  | 85                                | 2.2            | 1.877            | 0.00                     | 0.46      | 35.57           | 4.2          |
| APPROACH   | 30                                | 4.0            | 0.625            | 0.00                     | 0.75      | 13.20           | 3.6          |
| IDLE   | 7                                 | 26.0           | 0.237            | 0.05                     | 8.45      | 5.47            | 0.5          |
| LTO TOTAL FUEL (kg) or EMISSIONS (g)                               |                                   |                | 863              | 17                       | 3395      | 17262           | -            |
| NUMBER OF ENGINES  |                                   |                |                  | 4                        | 4         | 4               | 4            |
| NUMBER OF TESTS  |                                   |                |                  | 8                        | 8         | 8               | 8            |
| AVERAGE D <sub>p</sub> /F <sub>oo</sub> (g/kN) or AVERAGE SN (MAX) |                                   |                |                  | 0.1                      | 10.9      | 55.5            | 6.0          |
| SIGMA (D <sub>p</sub> /F <sub>oo</sub> in g/kN, or SN)             |                                   |                |                  | 0.1                      | 2.9       | 0.9             | 2.3          |
| RANGE (D <sub>p</sub> /F <sub>oo</sub> in g/kN, or SN)             |                                   |                |                  | 0-0.1                    | 7.5-14.13 | 54.68-56.38     | 3-8.3        |

### ACCESSORY LOADS

POWER EXTRACTION 0 (kW) AT - POWER SETTINGS  
 STAGE BLEED 0 (% CORE FLOW) AT - POWER SETTINGS

### ATMOSPHERIC CONDITIONS

|                      |                 |
|----------------------|-----------------|
| BAROMETER (kPa)      | 98.9-102.1      |
| TEMPERATURE (K)      | 284.1-293.2     |
| ABS HUMIDITY (kg/kg) | 0.00432-0.00968 |

### FUEL

|          |      |
|----------|------|
| SPEC     |      |
| H/C      | 1.9  |
| AROM (%) | 17.4 |

MANUFACTURER: Rolls-Royce plc  
 TEST ORGANIZATION: Rolls-Royce  
 TEST LOCATION: Derby  
 TEST DATES: 24/09/2009-03/08/2012

### NO<sub>x</sub> REGULATION PARAGRAPH

|   |                   |
|---|-------------------|
|   | 2.3.2 c) (CAEP/4) |
|   | 2.3.2 d) (CAEP/6) |
| x | 2.3.2 e) (CAEP/8) |

### REMARKS

1. Representative of Package B engines
2. DNS170301
3. Certification in accordance with Part III, Chapter 2, of Amendment 7 of ICAO Annex 16 Vol. II.
4. NO<sub>x</sub> levels in accordance with Part III, Chapter 2, 2.3.2 e) (CAEP/8)

Compliance with Fuel Venting requirements: x ('x' if complies, 'PR' if pre-regulation, '-' if information is not available)